

ISOPHOT monitoring of SV Cephei

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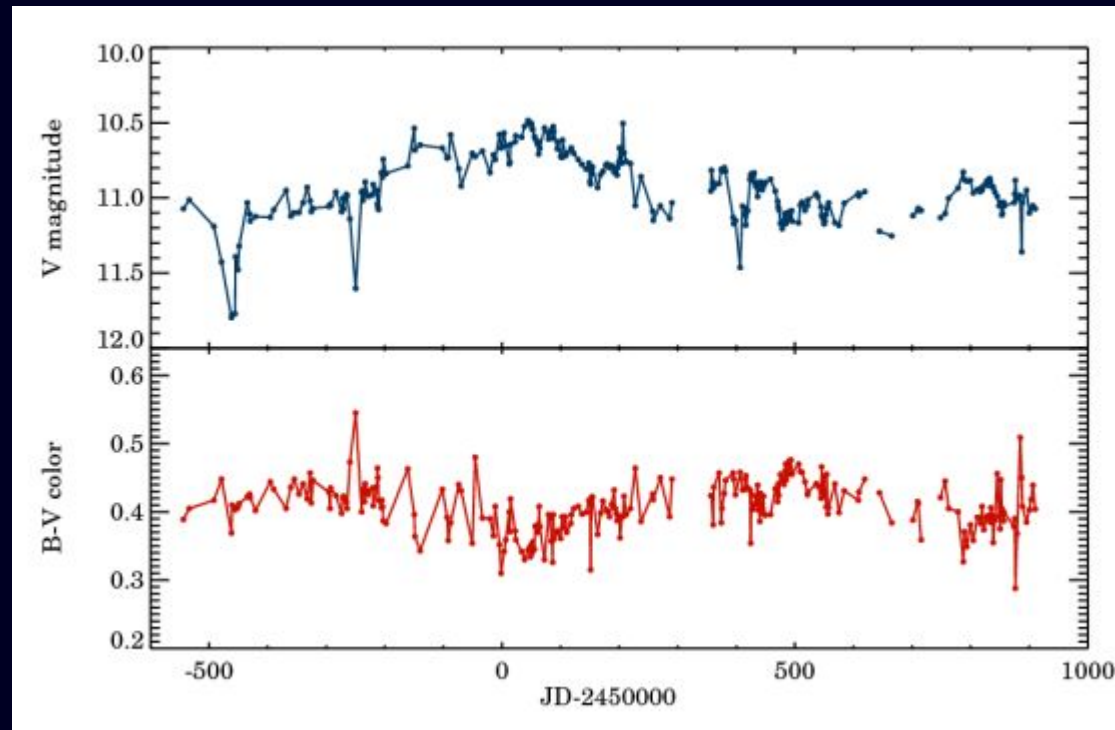
20 years of infrared astronomy at the Konkoly Observatory

May 11, 2006

Introduction – The UXOR Phenomenon

Herbig Ae stars: Mass : 3-5 M_{SUN}
 Age : < 10 Myrs

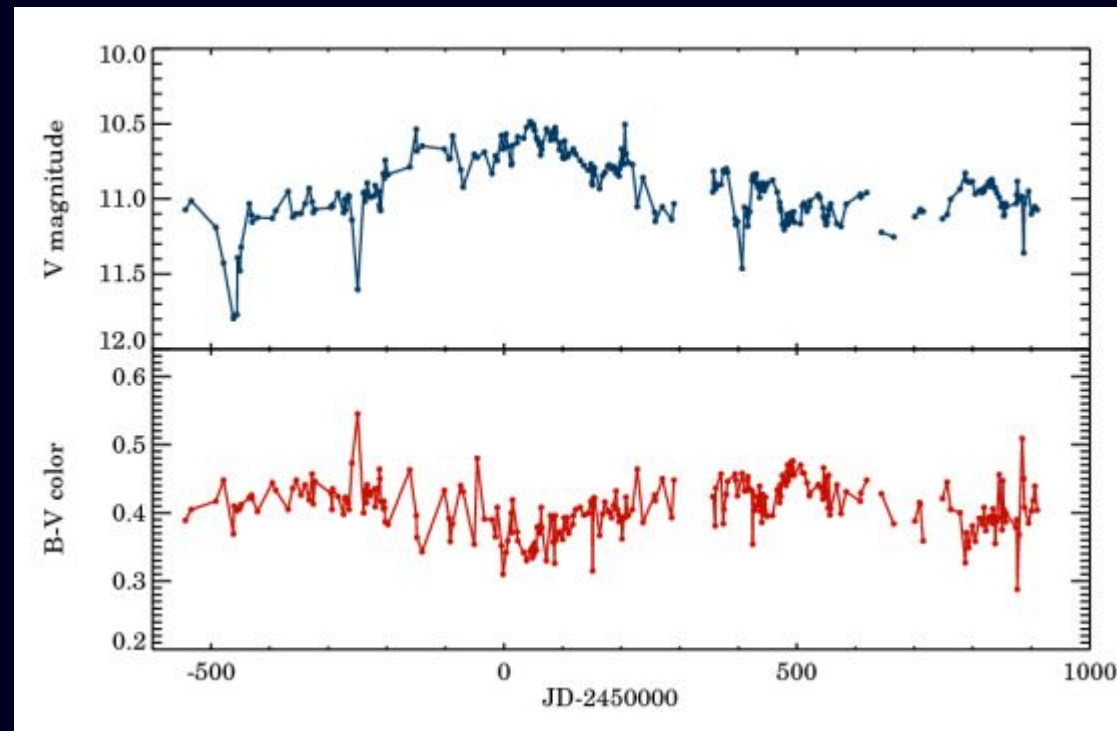
UX Ori (UXOR) type: - Subclass of Herbig Ae group
 - Optical variability (short- and long-term)
 - Infrared excess



(Rostopchina et al. 2000)

The aim of our study

Investigation of the circumstellar environment of UXORs
using the infrared variability as a new diagnostic tool!



(Rostopchina et al. 2000)

Observation and Data Reduction

Target : SV Cep

Infrared Space Observatory

12 wavelengths ($3.3\mu\text{m}$ - $100\mu\text{m}$)

19 epochs (1996-1998)



Data reduction:

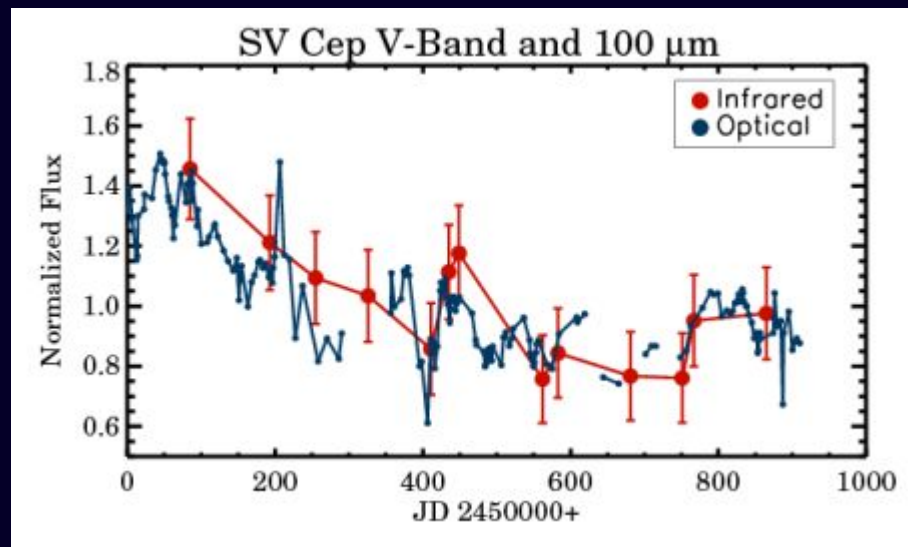
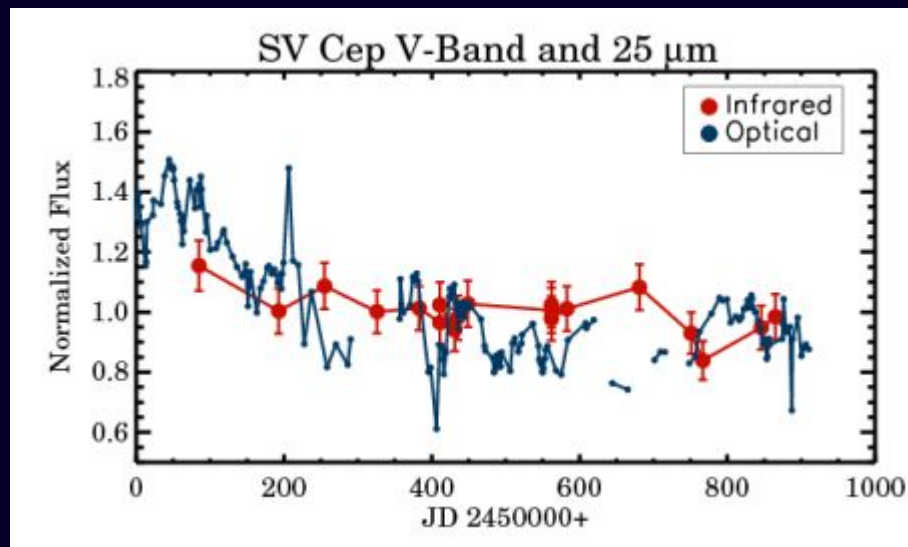
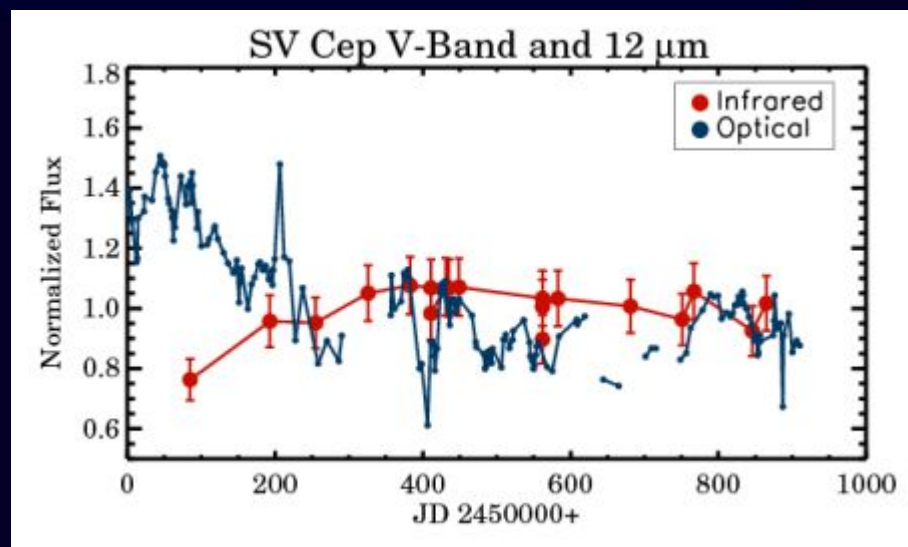
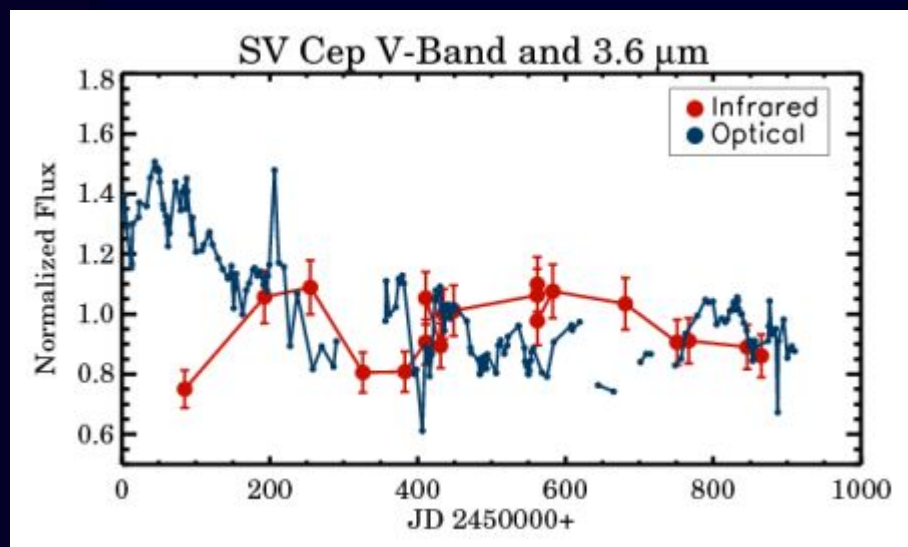
I. Standard data reduction with Phot Interactive Analysis

- Correction for some instrumental effect
- Flux calibration with on-board calibration lamp
- Error : 10-20%

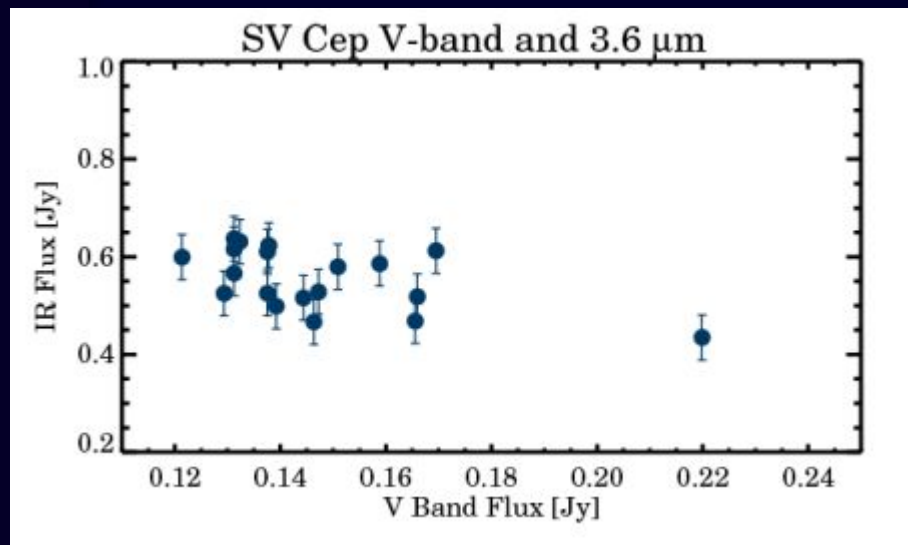
II. New data reduction technique

- Handle of transient instrumental effect
- Error : 5-8 % (relative)

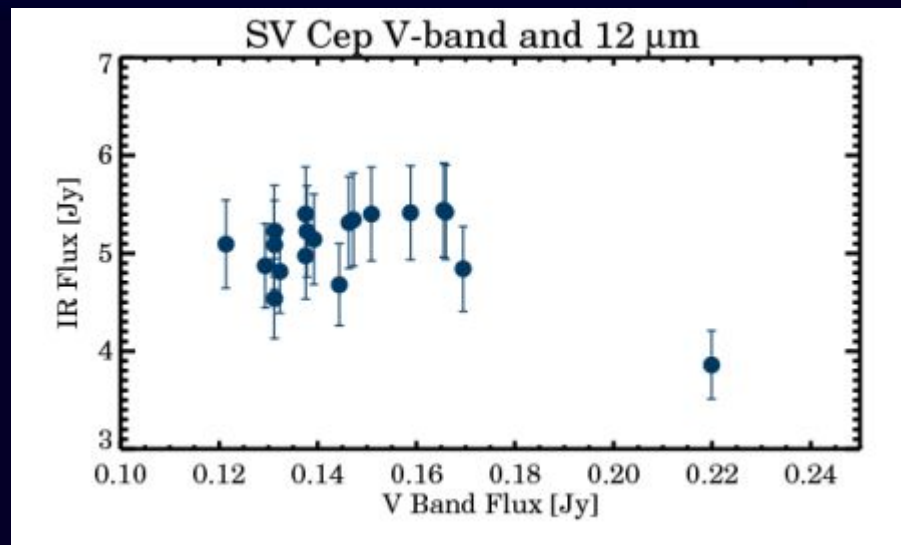
Results - Variability



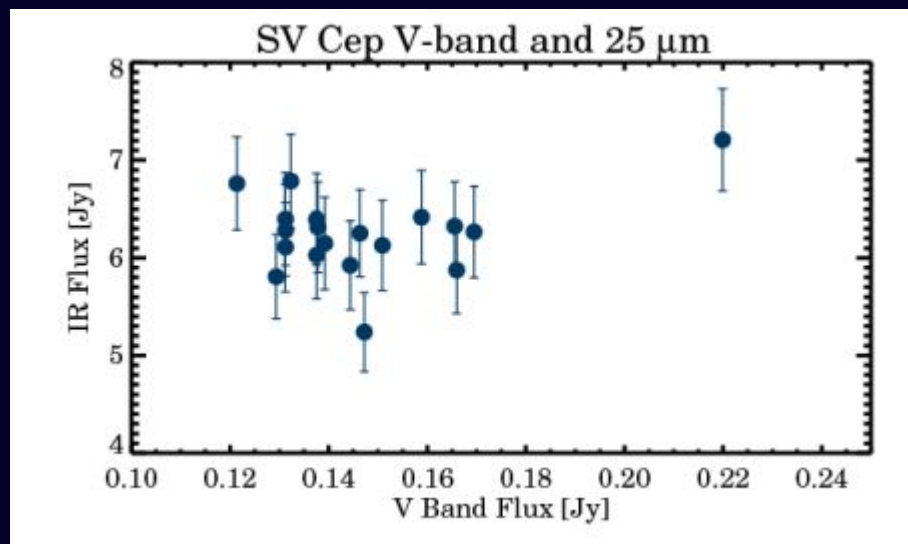
Results - Correlations



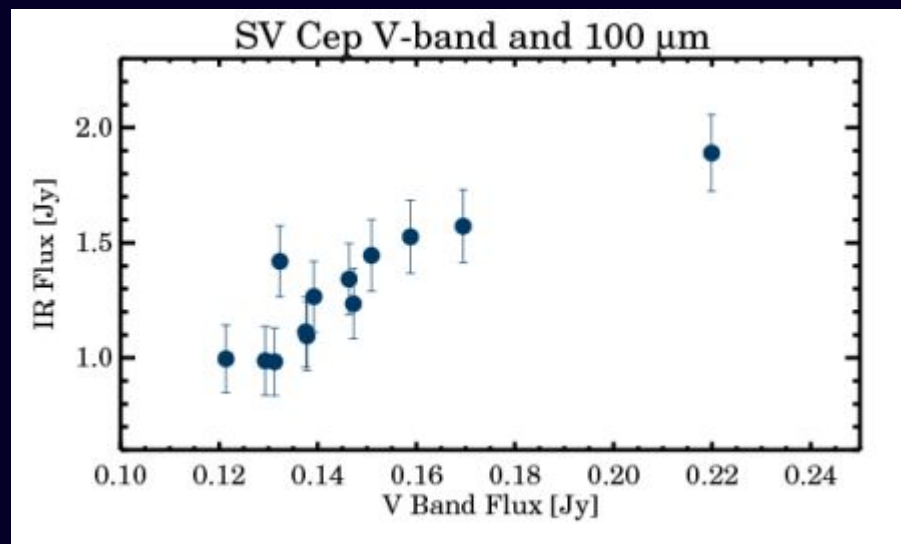
$$R = -0.56$$



$$R = -0.44$$



$$R = 0.28$$



$$R = 0.88$$

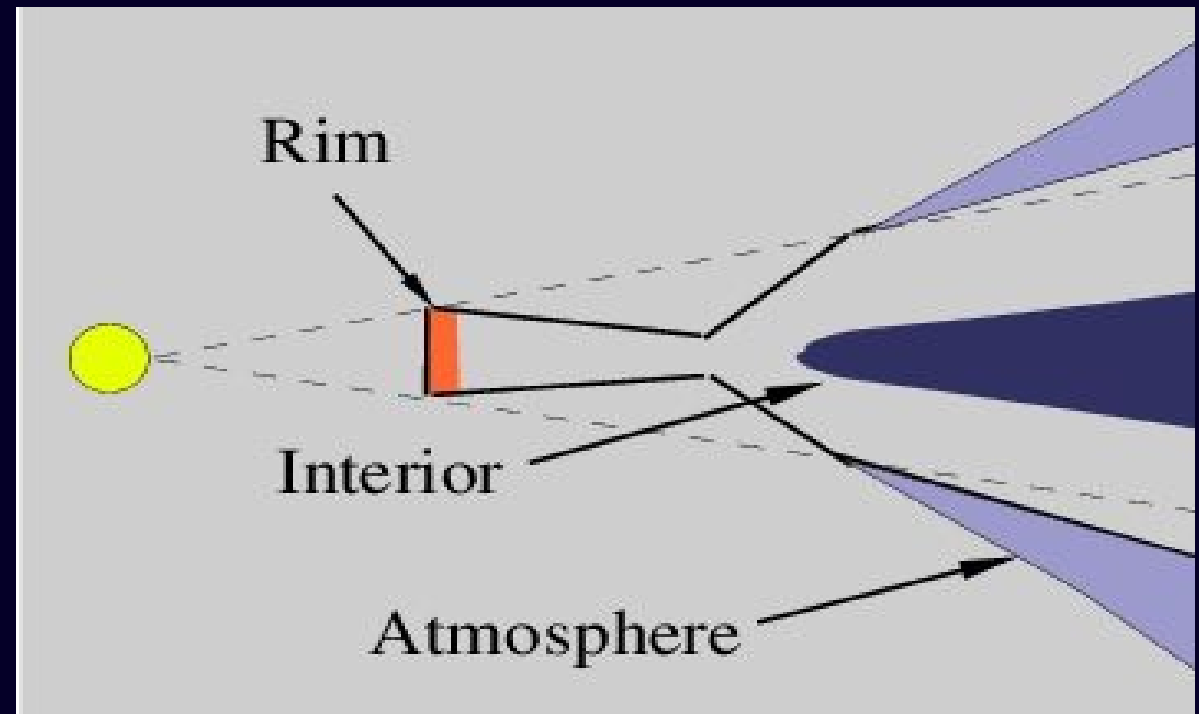
Passive irradiated disk with an inner hole

Model features (Dullemond et al., 2001):

- Vertical hydrostatic equilibrium => Flaring geometry
- Lack of the dust in the inner part of the disk
- Shadowing effect

Structures of the disk:

- “Puffed up” inner rim
- Disk Atmosphere
- Disk Interior



Fit with the model “CG+” (Dullemond et al. 2004)

Assumed parameters (Rostopchina et al. 2000):

Star Temp. : 10000 K

Luminosity : $100 L_{\text{SUN}}$

Star Mass : 3.1 Ms

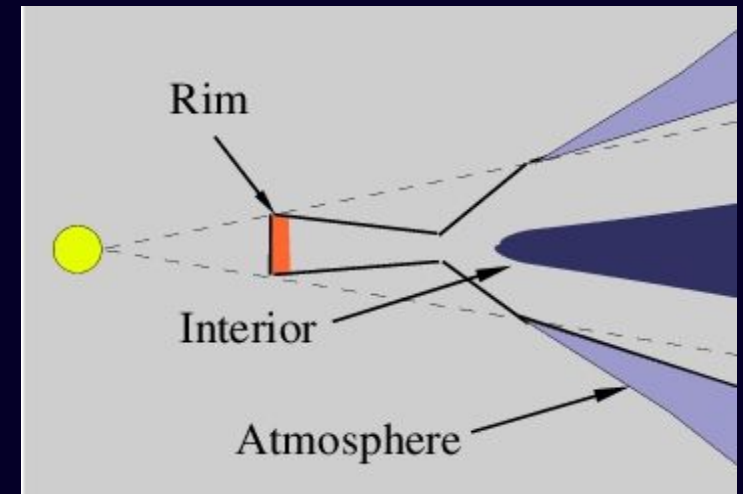
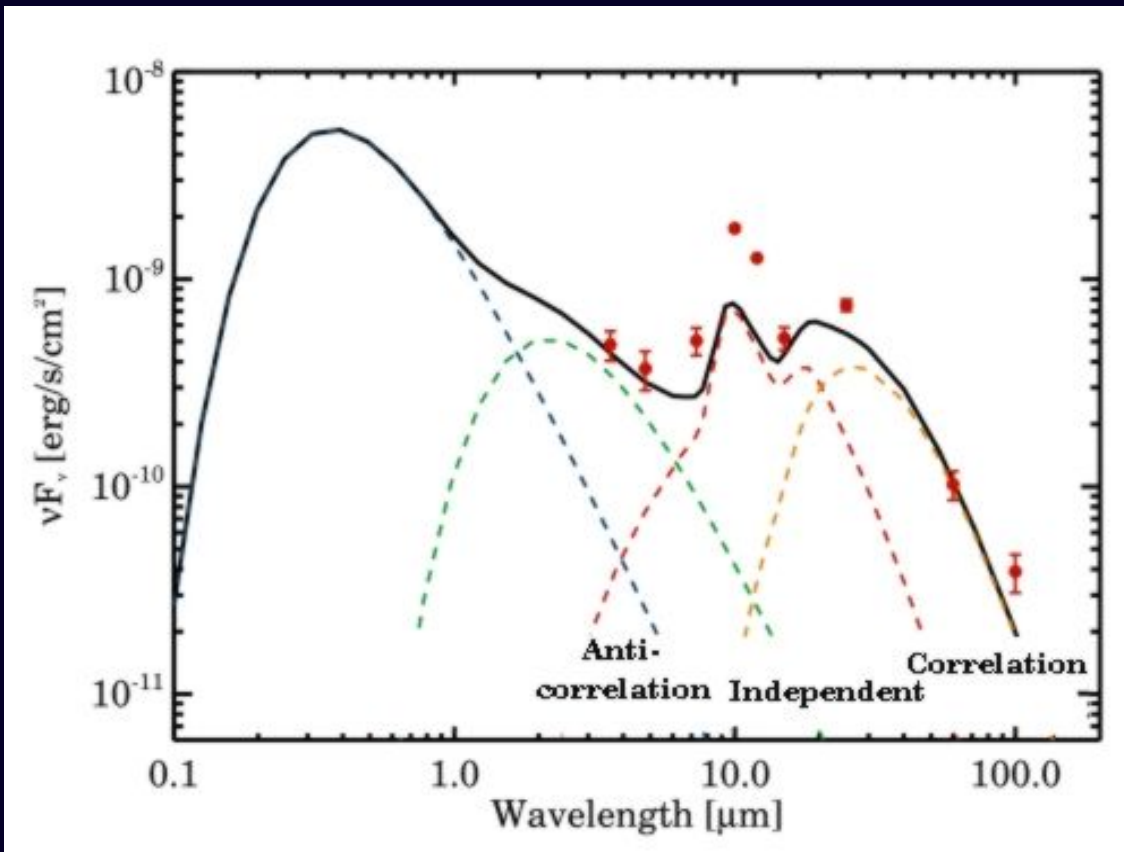
Fitted parameters:

Disk Mass : 0.0005 Ms

Outer Disk Radius : 220 AU

Inner Disk Radius : 0.6 AU

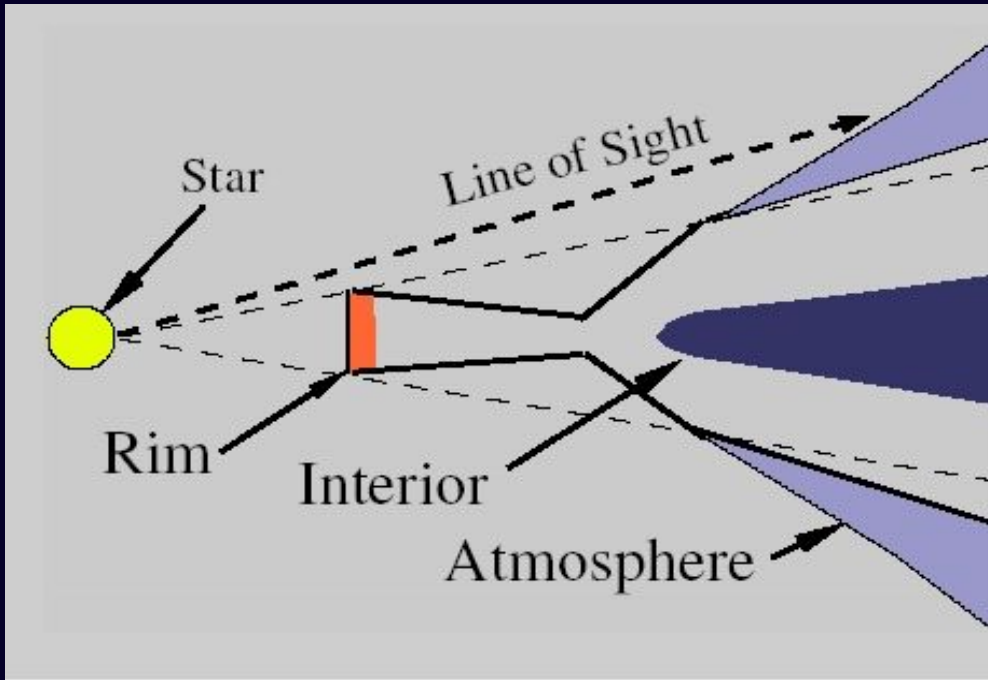
Inclination : 25°



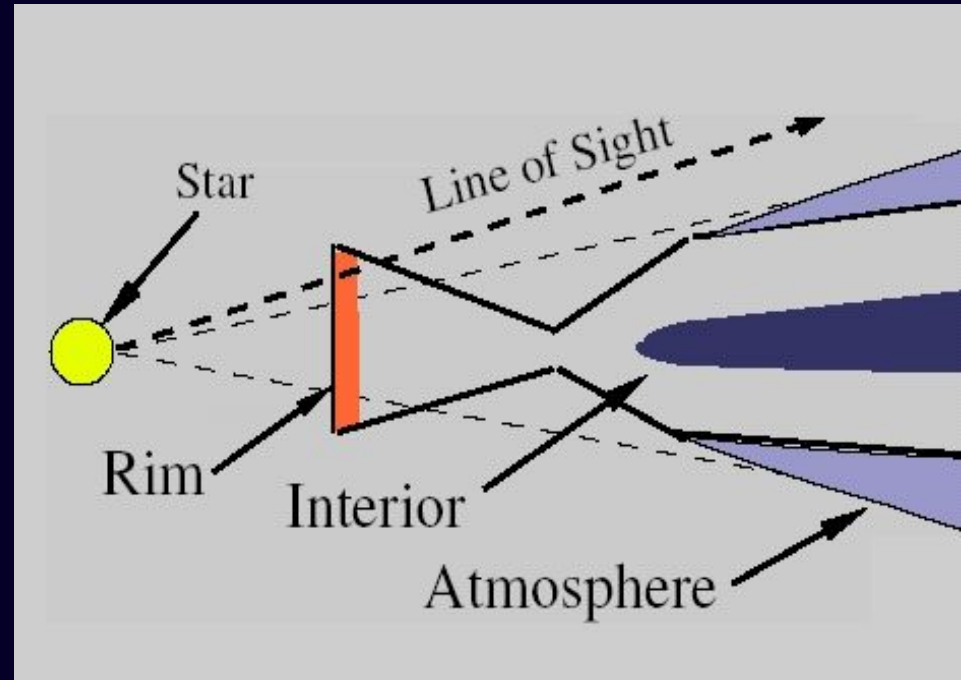
Conclusions – Explanation

Explanation:

- Obscuration by the changing inner rim
- Possible reason of the changes :
weak accretion



Bright state



Faint state

Further Plans

- Modelling the circumstellar disk with time-dependent code
- Processing the data of other three stars
(HD 104237, VV Ser, WW Vul)
- Parallel infrared and optical observation with as good time-coverage as it possible

Thank You for Your Attention!